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AUTHOR Nolen, Susan Bobbitt; Wilbur, Ronnie B.
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ABSTRACT

Fifty severely to profoundly deaf students (grades 4-8) were given a forced-choice picture selection test to investigate the effects of context on comprehension of difficult sentences. For one-half of the items, students matched pictures to isolated active, passive, or relative-clause sentences; for the other half, students performed the same task given similar sentences embedded in a context-providing paragraph. Analysis showed a significant facilitative effect of context for relative-clause sentences across reading levels. Findings support the theory that, like hearing children, deaf children can and do use contextual information to disambiguate difficult sentence structures. (Author/CL)

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Effects of Context on Deaf Students'
Comprehension of Difficult Sentences

Susan Bobbitt Nolen

and

Ronnie B. Wilbur

Purdue University

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Abstract

50 severely to profoundly deaf students were given a forced-choice picture selection test to investigate the effects of context on comprehension of difficult sentences. For half the items, students matched pictures to isolated active, passive, or relative-clause sentences; for the other half, students performed the same task given similar sentences embedded in a context-providing paragraph. Analysis showed a significant facilitative effect of context for relative-clause sentences across reading levels. The implications of these results for future practice are discussed.

Introduction

The purpose of the present study is to investigate deaf children's use of contextual information in connected prose in order to interpret sentences with difficult syntactic structures. The difficulty that deaf children have in learning to read has been well documented. Several studies (e.g., Furth, 1966; Trybus and Karchmer, 1977) have reported that the average hearing-impaired student does not progress beyond the fourth grade reading level. Much of the recent research has documented the hearing-impaired child's failure to master English syntax; this documentation has encouraged the teaching of syntax to deaf students by means of isolated sentences and sentence patterns.

Despite current practices, a growing body of research (Ewoldt, 1981a, 1981b; McGill-Franzen and Gormley, 1980; Quinn, 1981) suggests that deaf readers use strategies similar to those employed by hearing readers, such as the use of contextual information, orthographic regularity and world knowledge when reading connected prose passages. Gormley (1981) found that deaf children's comprehension and recall of text describing familiar events were significantly better than for unfamiliar events. She concluded that her subjects were using previously acquired world knowledge to help them understand the text. In a study of comprehension of syntactic structures, McGill-Franzen and Gormley (1980) found that truncated passive sentences (those with subject deleted, e.g., "The boy was killed.") were better understood when embedded in familiar prose than in isolation. However, there is a difference between familiar fairy tales and everyday classroom

reading which makes it inappropriate to generalize from their findings. This difference is that in everyday classroom reading, the particulars of plot and character are usually novel. Thus, although acquired world knowledge may be used to help the reader comprehend these materials (Kintsch and van Dijk, 1978), one cannot assume the kind of "familiarity" implied in McGill-Franzen and Gormley's study.

The present study investigates the effects of novel context on deaf children's comprehension of two sentence types: reversible full passives and subject-medial relative clause sentences. These two structures are thought to be mastered by deaf children (if at all) at a much later age than is typical of hearing children (Quigley, Smith and Wilbur, 1974). In isolation, deaf children tend to apply a subject-verb-object (SVO) strategy to the decoding of sentences, even when this is inappropriate. For example, given "The boy who kissed the girl ran away" deaf students are likely to select "The girl ran away" as being true. On the basis of such responses to isolated sentences, Quigley and his colleagues suggest that deaf students probably misunderstand these structures when they appear in connected text as well.

Concerned that these structures were difficult even for the oldest subjects in their study (18 years of age), the authors suggest the necessity of reading materials controlled for syntactic structure as "it is obvious that for these two structures, passives and relatives, deaf students must be misunderstanding the textbooks and other reading materials they

are expected to use". (Quigley, Smith and Wilbur, 1974, p. 338)

This attitude is reflected in current practice in classrooms for the deaf, where it is thought difficult structures must be "pre-taught" to deaf students in isolation, before they can be expected to comprehend them in context. Rarely are students allowed to read, uninterrupted, an entire story (Ewoldt, 1981b). However, recent research on both deaf and hearing students suggests that this focus on isolated sentences may be counter-productive.

The normal reading task is qualitatively different from the type of task used to assess syntactic ability. Unlike sentences in isolation, sentences in stories must be processed in relation to a) other sentences in the story, b) knowledge of the situational context, c) previously acquired knowledge of characters, and d) other contextual factors, all of which must be organized into a coherent whole by the reader (Black, Turner and Bower, 1979; Kintsch and van Dijk, 1978; Lesgold, Roth and Curtis, 1979). These processes cannot be applied to the comprehension of single sentences. In the Quigley et al. study, even hearing children had difficulty with some of the structures, which were presented in isolation. Other researchers (Barclay and Reid, 1974; Olson and Nickerson, 1977) have found that hearing children are able to process structures such as truncated and full reversible passives in stories as early as age five, much earlier than the estimate of 7 to 8 obtained by Quigley and his colleagues. Context provides redundant information that is helpful in disambiguating difficult sentences (Ewoldt, 1981b) and

is thought by some to activate world knowledge schemata enabling the reader to make the inferences necessary to comprehension (Graesser, Robertson and Anderson, 1981; Kintsch and van Dijk, 1978).

In addition to the evidence presented above on hearing readers, other studies (Gormley and Franzen, 1978; Ewoldt, 1981b) indicated that deaf readers are able in some instances to obtain meaning from connected prose, despite an imperfect grasp of English syntax. Their findings cast further doubt upon the appropriateness of the sentence-by-sentence approach in teaching reading and language to the deaf.

McGill-Franzen and Gormley (1980) reported a study designed to determine the effects of familiar context on the reading comprehension performance of deaf children. They compared second- and fourth-reader level deaf students on comprehension of truncated passive sentences in two task conditions. Subjects were asked to identify the picture that correctly represented the agent-object relationship in sentences presented either in isolation or embedded in familiar prose passages. The passages were constructed from protocols generated by other deaf students' retelling of familiar fairy tales ("Goldilocks" and "Little Red Riding Hood").

In contrast to previous research, neither age nor reading level were significant factors in subjects' comprehension of truncated passives. However, older and younger students at both reading levels performed significantly better on sentences presented in context. The authors use these findings to support

their view of appropriate language instruction for the deaf, which advocates the use of familiar context to teach English syntax. Unfortunately, these results are difficult to generalize to the normal reading process due to the confounding of familiarity and context. Task I, sentences in isolation, was always presented first to those subjects who completed both tasks. Only in Task II, sentences in context, were the titles of the stories presented. If the subjects were indeed familiar with the fairy tales used, they might have been able to do Task II using only the titles and their stored representation of the stories. In everyday reading, context provides information which is not necessarily familiar. In order to separate the effects of familiarity and context, the present study was designed to specifically test the effects of context on sentence comprehension, in a way more comparable to the normal reading task.

METHOD

Subjects

Fifty subjects were selected from the intermediate and high school departments (4-12) of a residential school for the deaf. All students in grades 4-8 were tested, but only those who met the following selection criteria were included in the analysis: average to above average IQ (based on the estimates of the psychological staff), average pure-tone hearing loss of 80 dB or greater, onset of hearing loss less than 2 years of age, and no other handicapping conditions.

Subjects were grouped by grade-equivalency scores on the reading comprehension subtest of the Stanford Achievement Test for Hearing-impaired Students (SAT-HI) (1973). Because of the relatively small population of students in grades 4-8, certain classes in the high school department that contained students scoring at the upper levels (3-5) of the SAT-HI were randomly sampled to obtain a sufficient number of students. A summary of group characteristics is presented in Table I.

It was important, for purposes of this investigation, to ensure that all students could comprehend simple active sentences. For that reason, those who scored below 2.0 (G.E.) on the SAT- HI were excluded. In addition, after the tests were scored, students who correctly answered fewer than 80% of all active items (two students at Reading Level 2) were dropped from the analysis.

Materials

Each subject completed a test composed of 30 randomly-ordered multiple-choice items. For each item, subjects read either a single sentence (Isolation condition) or a paragraph containing an underlined target sentence (Context condition), then chose the one line drawing (of four) that best illustrated the target sentence. Three types of target sentence were used: active, full reversible passive, and medial relative clause. For the Context condition, paragraphs consisted of four or five simple active sentences. Picture alternatives included the correct response, the usual (SVO) misinterpretation, and two plausible but incorrect alternatives.

Item construction. The first step in item construction was to

generate a list of easily pictured verbs and adverbs of place to be used as the core of each target sentence. Twenty-seven verbs were randomly assigned to each of the six (Condition X Sentence Type) treatment combinations, with 3 adverbs randomly assigned to either the Relative-Isolation or Relative-Context conditions. Sentences were generated for each verb or adverb, and context paragraphs were constructed for each context item such that context sentences gave clues to the correct interpretation of the target sentence (see Figure 1). Items were reviewed for appropriateness of vocabulary and clarity of context by two teachers of the deaf, and were judged to be within the ability level of all subjects.

Items were pilot tested at another residential school for the deaf prior to use in this study, and were revised as necessary. After completion of the experiment, internal consistency reliability of the test (Cronbach's coefficient alpha) was found to be .87.

Procedure

Tests were administered by the students' classroom teachers. Directions were printed in the test booklets, on overhead transparencies, and were read to the class using total communication (signs, fingerspelling and speech). Teachers were allowed to explain any unfamiliar vocabulary to the students, who were encouraged to take as much time as necessary to complete the booklet (less than 30 minutes was required).

RESULTS

A 5 (Reading Level) X 2 (Condition) X 3 (Sentence Type)

repeated measures analysis of variance was performed on the data. As predicted, a main effect for Condition was obtained, with subjects performing significantly better on context items ($F(1,45)=5.68, p<.05$). Sentence Type also appeared to influence performance ($F(2,90)=84.20, p<.001$; and further, interacted with Condition ($F(2,90)=18.05, p<.001$); and with Reading Level ($F(8,90)=9.61, p<.001$). A main effect for Reading Level was obtained ($F(4,45)=14.10, p<.001$) in the expected direction.

The Sentence Type X Condition interaction was further investigated using the Newman-Keuls sequential range test. The only sentence type that seemed sensitive to condition was the Relative (see Figure 2). Relative clause items were then analyzed separately, using a 5 (Reading Level) X 2 (Condition) repeated measures ANOVA (see Figure 3). Again, main effects were found for both Condition ($F(1,45)=18.60, p<.001$) and Reading Level ($F(4,45)=6.46, p<.001$). No interaction was observed between the two ($F<1$). Context appeared to benefit students regardless of reading level.

DISCUSSION

At least two major findings merit discussion here. First, as predicted, there was a strong beneficial effect for context (on relative clause sentences) across all reading levels. This supports the view that deaf children, like hearing children, actively attempt to connect ideas in a meaningful way while reading. These results cannot be attributed to mere familiarity with the plot, as was possible with McGill-Franzen and Gormley's (1980) study. That context did not interact with reading level

indicates that even lower-level readers make these inter-sentential connections while reading connected text.

A similar context effect, however, was not found for passive sentences. Although this may at first glance seem to contradict the findings for relative clause sentences, there are several factors that may be influencing the results for passives. First, it is probable that more classroom time is spent on passive sentences than on medial relative clause sentences. This may be due in part to the well-publicized findings of the Quigley group and the fact that passive voice sentences appear at earlier levels in classroom reading materials. As a result of instruction, deaf students may employ a comprehension strategy when first learning about the passive voice, such as "Look for the word 'by' and reverse the nouns". Indeed, the pattern of most passive sentences almost invites such a strategy, because the word "by" can provide such a strong clue. In contrast, the more complex and variable relative clause structure does not lend itself to this type of decoding.

This hypothesis becomes more credible when one looks at individual scores. Students at the lower reading levels scored higher on isolated passive sentences than on those presented in context. Of 15 students at Reading Level 2, only 7 answered at least one passive item correctly. Of those, 5 did better on isolated sentences. At Level 3, 5 out of 8 students did better on isolation items (the other three scored 80% or better in both conditions). By Level 4, only one subject scored higher on isolated passives, with similar results observed at the two

higher levels. It is possible that, at the lower reading levels, context made the structure (or its clue word) more difficult to detect.

Another factor influencing these results may be the fact that passive voice in general is mastered at a lower reading level than is the medial relative clause. The passive involves only one sentence, while relative clauses involve a main sentence and an embedded clause. This difference is reflected in the group scores for isolated passives. At Level 3, the group mean is above 70% for isolated passives, while even at Level 6, students score only around 67% on isolated relative clause sentences. This possible ceiling effect may contribute to the fact that context did little to help students on passive items.

The results of this study support the theory that, like hearing children, deaf children can and do use contextual information to disambiguate difficult sentence structures. This contradicts the earlier conclusion (Quigley, et al., 1974; Quigley and King, 1980) that because they misinterpret certain sentence structures in isolation, hearing-impaired children necessarily misunderstand them in connected text. The fact that this context effect was observed at all reading levels (2-6) suggests that introducing a new structure in context may be more beneficial than doing so in isolation. McGill-Franzen and Gormley (1980) stress the necessity of using familiar context in a type of "natural language" approach to English instruction. The results of the present study indicate that familiarity may not be crucial, as long as the context is within the scope of the

child's world knowledge.

It has been demonstrated that deaf children make use of contextual information while reading. To continue to concentrate on isolated sentence patterns outside a story or narrative context ignores a potentially powerful educational tool for teaching English to hearing-impaired students. This practice emphasizes formal linguistic structure rather than reading for meaning. By helping students learn to use context clues and previously acquired world knowledge along with syntactic information to obtain meaning from text, we foster a more efficient and productive reading strategy.

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Table 1
Demographic composition of experimental groups.

				Average Pure-tone		SAT-HI Reading	
				Hearing Loss (dB)		Comprehension Score	
<u>Age</u>							
Reading							
Level	n	Mean	S.D.	Mean	S.D.	Mean	S.D.
2	15	12;7	1;6	102.5	7.2	2.4	.08
3	8	14;3	3;8	95.3	10.3	3.5	.13
4	11	16;5	1;7	101.4	6.7	4.3	.28
5	8	17;5	0;11	102.7	12.7	5.4	.35
6	8	16;7	1;7	96.0	14.3	6.4	.24
—	—	—	—	—	—	—	—
TOTAL	50	15;1	2;10	100.1	10.1	4.1	1.48

Figure 1. Sample item: Relative-Context Condition.

Figure 2. Context by Sentence Type interaction

Figure 3. Context vs. Isolation condition, relative clause sentences